

the blade. Larvae were not cannibalistic, and rested in a J-shaped position on the underside of the leaves; when disturbed, they dropped off the leaf suspended by a silk thread.

The immatures of *N. sulphurina* are very similar to those of other Napeogenini species (D'Almeida 1938, Brown 1980, Brown & Freitas 1994: 14), including the presence of sublateral semicircular tubercles and a lateral stripe in the 4th and last instar larvae, and the shape and color of the pupa (except for *Epityches*, which has a green pupa similar to those of the Dirceonini and Godyrini; Brown & Freitas 1994). Prolegs with lateral black plates (a feature most common in species belonging to the basal tribes of Ithomiinae such as Tithoreini and Melinaeini) are known in *Napeogenes* and *Rhodussa*, but are absent in *Garsauritis* and all known immatures of *Hypothyris* and *Hyaliris*. The frontal transverse black band on the head capsule, shared with most known *Ithomia* (Brown & Freitas 1994:14, Srygley & Penz 2000), is known only in the genus *Napeogenes* within the Napeogenini (*N. sylphis*, *N. inachia*, Brown & Freitas 1994:14, and *N. apulia* [unpublished data, K. R. Willmott]); additional information about other species of *Napeogenes* is needed to confirm this pattern.

Marcelo Tabarelli, Inara Leal, André Santos and Antônio Aguiar greatly helped in field work in Alagoas and provided information on the study site in Serra Grande. This study was funded by Fapesp (grants 00/01484-1 and 04/05269-9 to AVLF) and is part of the project "Lepidoptera of São Paulo State" (BIOTA-FAPESP program - grant 98/05101-8). André V. L. Freitas thanks also the National Science Foundation (DEB-

0316505).

#### LITERATURE CITED

- BROWN JR., K. S. 1980. A review of the genus *Hypothyris* Hübner (Nymphalidae), with descriptions of three new subspecies and early stages of *H. daphnis*. *J. Lepid. Soc.* 34: 152-172.
- BROWN JR., K. S. & A. V. L. FREITAS. 1994. Juvenile stages of Ithomiinae: overview and systematics (Lepidoptera: Nymphalidae). *Trop. Lepid.* 5: 9-20.
- D'ALMEIDA, R. F. 1938. Estudo sobre três gêneros da sub-família Ithomiinae (Lepid.: Rhop.). *Mem. Inst. Oswaldo Cruz* 33: 231-247.
- DEVRIES, P. J. 1987. The butterflies of Costa Rica and their natural history. Papilionidae, Pieridae, Nymphalidae. Princeton University Press, Princeton, NJ.
- DRUMMOND, B. A., III & K. S. BROWN JR. 1987. Ithomiinae (Lepidoptera: Nymphalidae): summary of known larval host plants. *Ann. Mo. Bot. Gard.* 74: 341-358.
- FREITAS, A. V. L. 1991. Variação morfológica, ciclo de vida e sistemática de *Tegosa claudina* (Eschscholtz) (Lepidoptera: Nymphalidae, Melitaeinae) no Estado de São Paulo. *Rev. Bras. entomol.* 35: 301-306.
- FREITAS, A. V. L. & K. S. BROWN JR. 2002. Immature stages of *Sais rosalia* (Nymphalidae, Ithomiinae). *J. Lepid. Soc.* 56: 104-106.
- LAMAS, G. 2004. Ithomiinae, pp. 172-191. In: Lamas, G. (Ed.), Checklist: Part 4A. Hesperioidea-Papilionoidea. In: Heppner, J.B. (Ed.), Atlas of Neotropical Lepidoptera. Vol. 5A. Gainesville, Association for Tropical Lepidoptera/Scientific Publishers.
- SRYGLEY, R. B. AND C. M. PENZ. 2000. Larval description and host-plant record for *Ithomia diasia* Hewitson (Nymphalidae: Ithomiinae) in Panama. *J. Lepid. Soc.* 54: 145-146.

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*Received for publication 7 April 2004, revised and accepted 10 December 2004*

*Journal of the Lepidopterists' Society*  
59(1). 2005. 37-39

#### NOTES ON THE LIFE HISTORY OF *DYNASTOR DARIUS DARIUS* (FABRICIUS) (NYMPHALIDAE: BRASSOLINAE) FROM VENEZUELA

**Additional key words:** Biology, development, host plants, immature stages

Three *Dynastor* species are known to occur in South America (Urich & Emmel 1991a, 1991b). *Dynastor darius* (Fabricius), is a common, though usually not abundant, fast-flying, crepuscular butterfly, active at dawn as well as dusk. It has been reported from Brazil to Guatemala, including Trinidad (Aiello & Silberglied 1978, Urich & Emmel 1991b). Two subspecies are commonly recognized: *darius* from Mexico to the Amazon basin, and *stygianus* (Butler) from Guatemala to Ecuador (De Vries 1987). In Venezuela, subspecies *darius* inhabits semi-deciduous forests between 100 and 1000m.

This butterfly has been reported as a minor pest of pineapple crops (*Ananas comosus* (L.) Merr., Bromeliaceae) (Araque 1961, Petty et al. 2002). Host

records include also different Bromeliads in the genera *Aechmea*, *Billbergia*, *Bromelia*, *Orgydesia* and *Tillandsia* (De Vries 1987, Penz et al. 1999). In natural conditions, adults rest on soil where they are well camouflaged among dry leaves. However, we have seen some quietly resting on plant trunks close to the ground. M. Cock (personal communication) was able to easily catch a specimen that was resting on a thin palm trunk. Though it has been reported that the adults of *D. d. stygianus* and *D. d. darius* do not visit rotting fruit or other sources of nutrition (DeVries 1987, Urich & Emmel 1991b), we have seen them occasionally feeding on rotten mangoes (*Mangifera indica* L. Anacardiaceae) at dusk in at least two Venezuelan localities (Palmichal, Carabobo and Choroni, Aragua).

TABLE 1: Time and day of emergence of 37 adults of *Dynastor darius* Fabricius from same egg batch. Rearing locality: Maracay, Aragua, Venezuela (450 m). Rearing period: July - October. Mean Temp: 24.3 °C; Mean RH: 98.2 %

Emergence (Days)	1100 - 1200 h	1200 - 1300h	1300 - 1400 h	1400 - 1500 h	1500 - 1600 h
1 (Sept. 22, 1996)		2 ♂♂			
2 (Sept. 23, 1996)					1 ♀
3 (Sept. 24, 1996)		1 ♂			
4 (Sept. 25, 1996)	1 ♂	1 ♀		1 ♀	
5 (Sept. 26, 1996)	1 ♂				
6 (Sept. 27, 1996)	1 ♂	1 ♀	1 ♂	1 ♂	
7 (Sept. 28, 1996)	1 ♂		2 ♀♀	1 ♀	
8 (Sept. 29, 1996)		1 ♂	1 ♀	3 ♀♀	
9 (Sept. 30, 1996)			2 ♂♂	1 ♀	1 ♀
10 (Oct. 1, 1996)					
11 (Oct. 2, 1996)	1 ♂		1 ♀		
12 (Oct. 3, 1996)					
13 (Oct. 4, 1996)		2 ♂♂		2 ♀♀	1 ♀
14 (Oct. 5, 1996)					
15 (Oct. 6, 1996)	1 ♀	1 ♂		1 ♀	1 ♀
16 (Oct. 7, 1996)	1 ♂				
(Total adults emerged / Time period)	7 ♂♂	7 ♂♂; 2 ♀♀	3 ♂♂; 4 ♀♀	1 ♂; 9 ♀♀	1 ♂; 3 ♀♀

**Rearing notes.** On 6 July 1996, a female was captured at 1830 h in Los Cerritos, Choroní, Aragua (200 m), along the coastal border of Henri Pittier National Park, Venezuela, and taken to Maracay (450 m; annual mean temp: 24.6 °C (24.3 °C Jul - Oct); mean RH: 97% (98.2 % Jul - Oct). There it was placed in a 50 X 75 X 50 cm cage with a plant of *Bromelia plumieri* (E. Morren) L. B. Sm. (Bromeliaceae), and, fed fermented mango and sugar-water (about 30 % sugar). The butterfly was observed to feed on both. It deposited a total of 42 eggs in various spots inside the cage and on the leaves of *B. plumieri*, from 7 to 12 July 1996, after which it stopped laying.

All the eggs proved viable, and the 42 larvae were transferred to separate cages, where they were fed leaves of five Bromeliaceae [*Aechmea aquilega* (Salisb.) Griesb.; *A. lasserii* L.B. Sm.; *B. plumieri*, *B. chrysantha* Jacq.; and *Quesnelia arvensis* (Vell.) Mez, depending upon availability], and larval development observed and recorded. Plant identifications were made using Oliva Esteva & Steyermark (1987). Of the five plant species

offered to them, only *B. plumieri* had been reported previously as a larval food plant of this brassolid (DeVries 1985, 1987, Penz et al. 1999).

**Development.** A thorough description of eggs, larvae and pupae were made by Aiello & Silberglied (1978), who reared the species on *Ananas comosus* from eggs obtained from a captured female in Panama. Other details of the life history of ssp. *darius* were also given by Urich & Emmel (1991b) from a larva reared on *Aechmea nudicaulis* (L.) Griseb. (Bromeliaceae) in Trinidad. In our experience, the egg stage lasted about 12 days; the first instars emerged between 19 and 22 July and lasted between 10 to 12 days; the duration of the five larval stadia was 45 to 50 days; and the pupal stage lasted 11 to 31 days. These development times are consistent with previously reported data (Aiello and Silberglied 1978, Urich & Emmel 1991b), except for the pupal duration. Even though the mean pupal duration of 15 days was similar to the 13–17 days reported by Aiello & Silberglied (1978) and Urich & Emmel (1991b), some of our pupae took much longer to

develop.

**Larvae and pupae.** The larvae fed at night, a behavior we have observed in the field. During the day, they remained hidden, resting at the base of the plant, with the head down.

Though the larvae accepted all five of the above-mentioned bromeliads, we noticed that they ate *B. plumieri* more quickly. On several occasions we have found two or three larvae on *B. plumieri* plants in the Choroni area where the plant is quite common, while we have found at least one larva on the other four bromeliads used in our rearing in the same area. A. Aiello (personal communication) found a final instar *D. d. stygianus* on *B. plumieri* in Panama (late August 1995), so both subspecies probably have a similar range of food plants.

The larvae were very aggressive and territorial and five of them were damaged during fights and failed to complete development. The remaining 37 larvae all reached the pupal stage. Two days before pupation, each larva changed color (green to pale brown) and looked for a place to transform. Once a place was located the larva produced a silk support to which it attached, head down and remained quiescent for about three days. On the fourth day, the larva began moving with up and down and semicircular motions, and secreted a viscous, yellow, liquid that was originated from the pre-pupa. After moving and shaking strongly in circles, the larval skin was shed. Initially, the pupa was gelatinous and had an amorphous shape. Contractions slowed, and in a period of about five minutes, the pupa acquired its final form. The final coloration developed a few hours later. The pupa clearly resembled a cryptic *Bothrops* snake (Aiello & Silberglied 1978, DeVries 1987, Mallet & Joron 1999, Ulrich & Emmel 1991b), which are of common occurrence among plants of *B. plumieri* in the Choroni area.

Adults emerged from all 37 reared pupae, during a 16 day period, and all emergences occurred between 1100 and 1500 h (TABLE 1); most males emerged in late morning (1100 -1200 h), whereas most females emerged in the afternoon (1300-1500 h) (TABLE 1). The sex ratio was 1:1 (19 males and 18 females) (TABLE 1).

We would like to express our deepest appreciation to Annette Aiello for insightful comments and corrections to the original manuscript. We thank also Matthew Cock and Gerardo Lamas for comments and suggestions on the latest version. Ana Fernández (Maracay) and Pedro Infante (Choroni) provided us with some of the plants used to rear the butterflies.

#### LITERATURE CITED

- AIELLO, A., & R. E. SILBERGLIED. 1978. Life history of *Dynastor darius* (Lepidoptera: Nymphalidae: Brassolinae) in Panama. *Psyche* 85(4): 331 - 345.
- ARAQUE, R. 1961. El cultivo de la piña en Venezuela. Caracas, Consejo de bienestar Rural.
- DE VRIES, P.J. 1985. Hostplant records and Natural history notes on Costa Rican butterflies (Papilionidae, Pieridae & Nymphalidae). *J. of Res. Lepid.* 24(4): 290 - 333.
- DE VRIES, P.J. 1987. The Butterflies of Costa Rica and their Natural History, Papilionidae, Pieridae, Nymphalidae. New Jersey, Princeton University Press.
- MALLET, J., & M. JORON. 1999. Evolution of diversity in warning color and mimicry: polymorphisms, shifting balance, and speciation. *Ann. Rev. of Ecol. and Syst.* 30: 201 - 233.
- OLIVA ESTEVA, F., & J.A. STEYERMARK. 1987. Las Bromeliáceas de Venezuela. Caracas, Editorial Armitano.
- PENZ, C.M., A. AIELLO, & R.B. SRYGLEY. 1999. Early stages of *Caligo illioneus* and *C. idomeneus* (Nymphalidae, Brassolinae) from Panamá, with remarks on larval food plants for the subfamily. *J. Lep. Soc.* 53(4): 142 - 152.
- PETTY, C.J., G.R. STERLING, & D.P. BARTHOLOMEW. 2002. Pests of Pineapple. Pp. 157 - 195. In Peña, J.E., J.L. Sharp, & M. Wysoki (eds.), *Tropical Fruit Pests and Pollinators*. UK, CABI Publishing.
- URICH, F.C., & T. EMMEL. 1991a. Life history of Neotropical butterflies from Trinidad. 4. *Dynastor macrosiris* (Lepidoptera: Nymphalidae: Brassolinae). *Trop. Lepid.* 2(2): 141 - 144.
- URICH, F.C., & T. EMMEL. 1991b. Life history of Neotropical butterflies from Trinidad. 5. *Dynastor darius darius* (Lepidoptera: Nymphalidae: Brassolinae). *Trop. Lepid.* 2(2): 145 - 149.

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*Received for publication 15 May 2004; revised and accepted 9 November 2004*